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# RESEARCH ARTICLE

# Music-Based Community Interventions for Healthy Aging: Psychological Mechanisms of Emotional Regulation in Older Adults

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## ABSTRACT

The researchers compared the outcomes of eight-week music-based community-based intervention on emotional wellbeing and emotional regulating in 200 older adults in China (Intervention n = 100; Control n = 100). The intervention members used to perform group singing, guided music listening, and rhythmic movement twice a week where the members of the control group used to carry out regular activities within the community. Emotional outcomes, positive affect, negative affect, perceived stress, and depressive symptoms, and emotional regulation strategies, cognitive reappraisal, and expressive suppression, were measured at both baseline (T1) and post-test (T2).

The findings revealed strong changes in the intervention group in comparison to the control group. The intervention group showed a high improvement in positive affect (T1 = 2.74; T2 = 3.25) with the difference in positive affect being +0.51 as compared to control group ($t = 21.07$, $p < .001$). The negative effect reduced significantly (Intervention: 2.54 → 2.15; Control: 2.56 → 2.54), with a group difference of −0.39 versus −0.02 ($t = -16.46$, $p < .001$). There was also a significant decrease in perceived stress (Intervention: 2.87 → 2.32; Control: 2.84 → 2.82), and the mean change of - 0.55 in comparison with mean change of −0.02 ($t = -23.96$, $p < .001$). The difference between the depressive symptoms was found to be significant (Intervention: 3.01 → 2.63; Control: 2.99 → 2.98), and the difference in the mean change between −0.38 versus −0.01 ($t = -15.76$, $p < .001$).

The intervention group had a better emotional regulation with increased cognitive reappraisal (+0.63 vs. +0.05; $t = 27.18$, $p < .001$) and reduced expressive suppression (−0.41 vs. −0.01; $t = -22.72$, $p < .001$). There was partial support of indirect effects in mediation analyses, given that the intervention had a strong predictor of increase in reappraisal ($\beta = 0.88$, $p < .001$), but reappraisal did not affect prediction of positive affect change group controlling ($\beta = 0.067$, $p = .361$), showing little mediation although strong direct effects.

In general, the intervention effected significant and clinically significant changes in emotional functioning in the older adults. Results indicate that music interventions based on culture and community can be useful in improving emotional well-being and emotional regulation, which provides a scalable approach to improving healthy aging in China.

***Keywords:*** Community-based; intervention group; emotional regulation

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# 1. Introduction

China is experiencing one of the fastest demographic aging processes in the world with more than 280 million people aged 60 years and above and it is projected to keep increasing in the next few decades. With the increasing age, older adults experience various psychological difficulties such as emotional instability, a greater stress level, lack of social interaction and their exposure to depressive and anxiety feelings. The psychological issues are compounded in the urban Chinese societies where the traditional family systems are becoming weaker, intergenerational support is reducing and the elderly people in most cases feel lonely or have few social engagements. The support of emotional health and psychological health needs of this population has made it a national concern that is in line with the Healthy Aging and Active Aging policy frameworks initiated by China. In this framework, community-based music interventions have become a promising culturally pertinent strategy in promoting the emotional well-being of older adults [1].

Music has a strong cultural and historical role in China. Musical practices have been greatly used as instrument of emotional expression, social bonding and spiritual development since the same began with manual folk singing and all the way to classical instrumental music. Contemporary community centres often include music's in the health promotion of the elderly, and these programs may involve community choirs, group drumming, and guided listening. Studies in psychology and neuroscience indicate that music has the ability to control emotions, trigger reward systems, facilitate recall, and encourage connectedness in others. Nevertheless, even when it is observed internationally that music could be used as a therapeutic tool by the elderly, empirical research based on Chinese community-based context is scarce, inconsistent, or methodologically insufficient [2]. Most of the interventions that are available are not rigorously designed experimentally, they do not isolate the psychological process, nor do they represent the cultural dynamics that are unique to China.

With such a dire need of mental healthcare amongst the older adults in China and the prevalence of the music activities in the community centers, it is necessary to create a strong body of empirical data to comprehend how and why music-based interventions are helpful in improving emotional well-being.

## 1.1. Research problem

Despite the growing use of community-based music programs in many parts of China, a lack of scientific knowledge regarding the psychological processes involved, especially their impact on emotional regulation that is a major predictor of healthy aging, is noted. Cognitive reappraisal and expressive suppression are emotional regulation strategies that have been known to have a considerable influence on the mental health of the case in older adults [3]. However, there is very limited research in China that has investigated whether the psychological benefits of music interventions were mediated by improvement in emotional regulation. Also, there is a paucity of studies that use a randomized controlled trial, large sample size or standardized outcome measures.

Therefore, the research issue that the presented study considers is:

- The empirical evidence conducted to assess the psychological processes through which music-based community interventions affect emotional well-being of older Chinese adults is not rigorous.
- Policymakers and practitioners find it hard to develop evidence-based community programs that will effectively promote healthy aging without knowing about these mechanisms.

## 1.2. Research Objectives

The study is expected to address this gap by analyzing an 8-week community-based music intervention based on singing in choirs, guided music listening, and group activities with rhythms. The randomized controlled trial (RCT) study design is taken in the study involving 200 older adults in two cities in China.

The main research questions are as follows:

- To assess the impact of music-based community intervention on such emotional outcomes as positive affect, negative affect, perceived stress, and depressive symptoms in older adults in China.
- To investigate the effect of the intervention on emotional regulation strategies (cognitive reappraisal and expressive suppression) in particular.
- To examine the moderating role of emotional regulation in the connection between engagement in activities based on music and the psychological well-being outcomes.
- To deliver culturally informed evidence to inform programs of healthy aging in the Chinese community.

These tasks combine both the review of the results and an examination of the psychological mechanisms.

## 1.3. Research Questions

According to the study objectives, the research questions of the study are as follows:

1. Are there better differences in emotional well-being (positive affect, negative affect, stress, and depressive symptoms) in those who attended an 8-week community-based music intervention than those who did not attend a wait-list control group?
2. Will the intervention improve emotional regulation skills, i.e. more cognitive reappraisal and less expressive suppression?
3. Are the results of the music intervention mediated by alterations in emotional regulation on the outcome of the psychological well-being?
4. What is the effect of Chinese cultural context on the perceived emotional and social benefits among the participants in music program?

These research questions offer an orderly basis on which empirical tests and interpretation can be made.

## 1.4. Significance of the Study

This work has theoretical and practical importance. In theory, the approach makes contributions to the community psychology, gerontology, and the music therapy disciplines by elucidating the psychological processes involved in the music-based interventions. Examination of the emotional regulation as a mediating variable enables the study to transcend the findings of a mere evaluation and elaborate more on the effect of music on the emotional functioning in the elderly population.

In practice, the results can be of significant use to the fast-changing community health system in China. Music sessions are cheap, culturally significant and can easily be incorporated in the already existing community centres. Findings of this research could help social workers, community health practitioners, elderly service providers, and policymakers to come up with effective and scalable interventions that can be used to facilitate emotional well-being. Its findings can also be useful in the context of the national mental health promotion and community-based support of the elderly provided by China [4].

Moreover, this work focuses on the psychological research that is contextualized in culture. A majority of the studies concerning music therapy in the world are a product of Western societies that have quite a difference with China in terms of collectivism, music tastes, social norms and group formations. This study contributes to the cultural sensitivity of world gerontological knowledge by basing its intervention on the Chinese cultural practices and studying the psychological mechanisms of the same [5].

Overall, the research paper is a valuable contribution to the study of a pressing public health problem in China, it uses a powerful empirical research approach, and presents theoretically significant results that can also be applied to the academic knowledge and in the practice in the community promoting healthy aging.

# 2. Literature review

## 2.1. Community Interventions that are based on music, emotion regulation and mental health of older adults

The use of music-based community interventions has been incorporated into the aging and health research with increasing interest in the last 20 years. Syntheses of evidence indicate the potential of receptive music listening, active music-making, and organized music therapy to have a beneficial effect on emotional, cognitive, and social functioning in older adults. Interventions can be as simple as listening programs, or as multi-combined, with elements of group singing, rhythmic movement, and interpersonal connection. Specifically, the ideas of community choir participation could be linked to the better quality of life, the decreased level of depressive symptoms or loneliness, the increased level of joy, purpose, and social relatedness [1].

In addition to the overall emotional effects, emotion regulation has been found as one of the main psychological processes by which music can help in healthy aging. Listening to music and music-making has the ability to influence affective states, express emotions and better cope with stress. Positive mood, psychological distress, emotional resilience have been improved through group based musical activities particularly singing [6]. When the participants are engaged in music-linked group sessions, they might learn to approach the emotional process more adaptively, especially when responding to stress and negative affect.[7]

The majority of the available literature however targets mood or depressive symptoms as outcome measures and many do not explicitly model emotion regulation strategies including cognitive reappraisal or expressive suppression as the underlying mechanisms. This restricts the knowledge on the way the music-based interventions manifest their psychological impacts particularly on the elderly in the community setting [8]

## 2.2. The use of music-based interventions in China

The evidence regarding the use of music interventions with older adults in the Asian setting, and China in particular, is growing, albeit, rather limited. In the mainland of China and other parts of Asia, a number of studies have documented that receptive music therapy and music-listening interventions have the potential to enhance the cognitive skills and depressive symptoms in older adults with mild cognitive impairment or dementia. Other forms of interventions (group based) by incorporating traditional Chinese folk music, or mixing Tai Chi with background music have been also found to improve the quality of life and depressive symptoms among community-based older people. Meanwhile, the community music therapy in China is defined as a developing sphere, which is gaining pace slowly in comparison with the Western nations [9].

The programs are designed through workshops in urban community centers and there are few standardized protocols, as well as large-scale assessments. Recent contributions to the study of the music

preferences of Chinese older adults imply that the culturally specific listening patterns should be understood in order to develop acceptable and engaging interventions. Comprehensively, there has been a tendency of the Chinese literature to concentrate on cognitive or general mental health outcomes [10], and there is less evidence in terms of emotional regulation being the outcome or the mechanisms. Available interventions are small, non-randomized or confined to clinical subgroups, and therefore, limit the translation of results to a larger community-dwelling older adult population.

## 2.3. Emotion regulation during aging: theoretical accounts

The concept of emotion regulation has gained a new focus in explaining psychological workings in late life. The process model of emotion regulation by Gross identifies various families of strategies: situation selection, situation modification, attentional deployment, cognitive change (reappraisal), and response modulation (including expressive suppression) which address different stages in emotion-generative process.

It has been found that more adaptive strategies are those applied at an earlier stage of the process (e.g., reappraisal), as opposed to those applied at a later stage (e.g., suppression) [11].

Within the framework of aging, the Socioemotional Selectivity Theory (SST) is that when the perceived time horizons decrease, older adults pursue goals and experiences that are emotionally significant. This motivational change is coupled with more emphasis on positive news and better emotional regulation than young adults. As empirical research suggests, older adults tend to indicate greater emotional stability, more motivation to manage emotions, and dissimilar application of such strategies as reappraisal and suppression.

Expressive suppression can be more socially mandatory but can as well be associated with psychological stress in Chinese cultural contexts where harmony, restraint and social appropriateness are sought after [12]. The community activities using music, and particularly group singing and culturally relevant music listening, might provide the older adults with the possibility to change their rigid suppressive approach toward more flexible strategies including the sharing of emotional experiences, revaluating life experiences, and co-creating constructive emotional climates within a group. However, these mechanisms have not been experimentally validated on proved measures of emotional regulation on Chinese elderly people.

## 2.4. Research gap

Combined, existing literature indicates that there are a number of critical areas where this study is aimed to fill in:

**Little attention to processes:** A number of studies have shown that music interventions have the potential to elevate mood, lessen depression, or augment the quality of life in elderly people; however, few investigate strategies of emotional regulation as mediators between music attendance and psychological well-being.

**Lack of representation of Chinese community settings:** Although there are Chinese studies on the advantages of music therapy in cognitive functioning and depression, they usually involve a clinic population or a small sample of community-dwelling elderly individuals, in general.

**Lack of cohesive knowledge on culturally based interventions:** Most of the studies conducted globally are in the Western setting, and little focus is on the role of cultural norms, preference of music and social organization in China to influence the emotional response of cellular musical sounds.

**Lack of integration of aging and emotion theories:** Although there are solid frameworks like the process model created by Gross and the Socioemotional Selectivity Theory, there are few empirical studies

of music interventions that combine these two theories in order to evaluate the age effects in emotional regulation in a systematic manner.

The current research paper fills these gaps by applying 8-week multi-component community-based intervention on music in Chinese community centres using randomized controlled trial with a fairly substantial sample. The strategies of emotional regulation (cognitive reappraisal and expressive suppression) are directly represented as the mediators within the intervention participation and the outcomes of emotional well-being.

## 2.5. Theoretical framework

The conceptual model as in Figure 1 that was used in this research combines Gross process model of emotion regulation with Socioemotional Selectivity Theory and a community-based music intervention approach.

In his process model of emotion regulation, Gross supports the idea that people are able to regulate emotions across various levels of the emotion-generative process by applying such processes as situation selection, cognitive reappraisal, and response modulation.

In this context, activities that are based on music can be used as:

- **Selection of situations:** deciding to move into a good, conducive musical atmosphere;
- Situation modification: redefining social and emotional situation by singing together and socializing;
- **Cognitive change:** restructuring personal experiences during work with valuable song lyrics or musical memories;
- **Response modulation:** modulating the emotional arousal through rhythm, breathing and vocalization [13].

According to the Socioemotional Selectivity Theory (SST), older people, in turn, focus on emotionally relevant experiences and goals and tend to invest more efforts into those activities, which offer them a sense of purpose, emotional satisfaction as well as a sense of social connectedness.

Community music programs resonate with these motivational changes by providing an emotionally charged, socially implicated experience that can be useful in promoting positive affect and distress reduction [14]. Community-based intervention perspective lays stress on the access and group-oriented programs that are entrenched in the local service systems. Community centres provide important platforms through which low-cost interventions that are culturally appealing are delivered in the Chinese setting, which includes activities based on group singing and traditional music.

According to this combined model, the community intervention based on music is conceptualized as a structured context that amplifies the chances of adaptive emotional regulation, especially the expansion of cognitive reappraisal and decrease in expressive suppression, which consequently increase such indicators of emotional well-being as positive affect, negative affect, stress as well as depressive symptoms. Emotional regulation can therefore be described as a psychological process that lies between the involvement in music-based community and the outcome of healthy aging among the older adults in China.

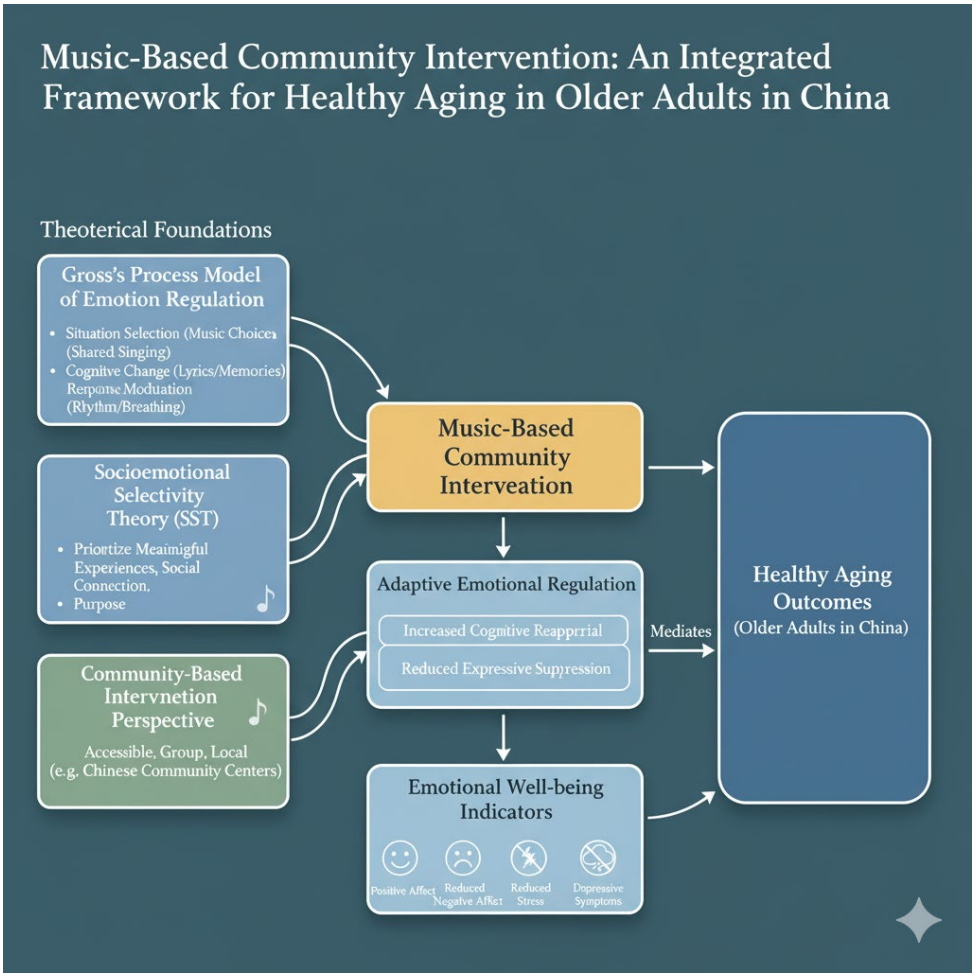


**Figure 1.** Theoretical framework

# Hypotheses

The following hypotheses as is Table 1 are formulated based on previous research and theoretical framework under which the given research was conducted:

**Table 1.** Hypotheses

| Hypothesis Category | Code | Hypothesis Statement |
|---|---|---|
| **H1. Immediate Intervention Impact** | H1a | No significant difference in positive affect between intervention and control group at post-test. |
| | H1b | Negative affect will be significantly lower in the intervention group compared to the control group at post-test. |
| | H1c | The intervention group will show a greater reduction in perceived stress than the control group. |
| | H1d | Depressive symptoms will be significantly reduced in the intervention group relative to the control group. |
| **H2. Effects on Emotional Regulation Strategies** | H2a | Cognitive reappraisal will increase significantly in the intervention group compared to the control group. |
| | H2b | Expressive suppression will decrease significantly among intervention participants relative to controls. |
| **H3. Mediation Effects** | H3a | The intervention's effect on positive affect, perceived stress, and depressive symptoms will be mediated through cognitive reappraisal. |

| Hypothesis Category | Code | Hypothesis Statement |
|---|---|---|
| | H3b | The intervention's effect on negative affect and depressive symptoms will be mediated through expressive suppression. |
| **Overall mediation interpretation** | — | The music-based intervention enhances emotional well-being partly through improvements in adaptive emotional regulation strategies. |

**Table 1.** (*Continued*)

# 3. Materials and methods

The research methodology of the study was developed to strictly study the psychological impact of a community-based music-based intervention on elderly people in China in terms of emotion regulation and emotion well-being. Since the importance of evidence-based and culturally relevant approaches to healthy aging by the growing focus was on the significance of randomized controlled trials (RCT), the chosen research design has been a randomized controlled trial (RCT), which is a methodology with high internal validity and power of causation determination. The intervention was implemented in actual community contexts and this helped to validate an ecological validity, cultural relevance and feasibility in case of a large-scale implementation in future. The study design, methods of training participants, components of interventions, measurement practices and methods of analysis are described in detail to enable replication and also to meet the international standards of clinical and community-based researches.

## 3.1. Study design

In this study, a parallel-group randomized controlled trial was used, involving two conditions (music-based community intervention and wait-list groups) as in Figure 2. Respondents would be measured at two time points as follows: baseline (T1) would be administered one week before the intervention and then, post-test (T2) would be administered within one week after the end of the 8-week intervention. The authors concentrated on emotional well-being outcomes (positive affect, negative affect, perceived stress, and depressive symptoms) and emotion regulation methods (cognitive reappraisal and expressive suppression) [15]that were used as mediating in the postulated paths. The RCT format was selected to reduce the impact of selection bias, internal validity, and, in addition, provide an opportunity to assess the effectiveness of the chosen intervention in contrast to the standard community activities.

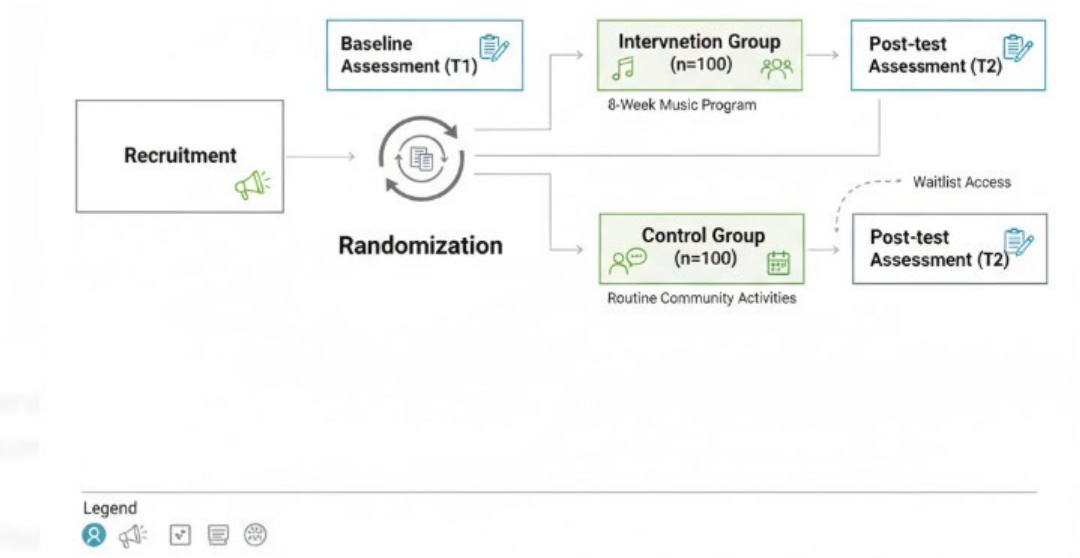


**Figure 2.** Study design

### 3.2. Setting and participants

The research was carried out in four urban community services centres in two big cities in eastern China. These facilities play the role of social and recreational centres to the elderly and offer an environment rich in culture to execute healthy interventions. The participants were community-dwelling older adults of age 60 years and more. Qualification required a number of conditions such as frequent attendance at the community centre, possessing some or limited communication skills and lack of such cognitive impairment and psychiatric disturbance [16]. Patients who had significant neurocognitive disorders or physical impairments that made them not safe to participate were excluded.

Inclusion and Exclusion Criteria [17] for Participant Recruitment as in Table 2

**Table 2.** Inclusion and Exclusion Criteria

| Category | Criteria |
|---|---|
| Inclusion Criteria | • Age ≥ 60 years |
| • Registered residence in the community catchment area | |
| • Regular attendance at community center (≥ once/week for past 3 months) | |
| • Ability to communicate in Mandarin or local dialect | |
| • Able to follow simple group instructions | |
| • No severe cognitive impairment (screened via Mini-Cog or equivalent) | |
| • No severe hearing impairment that prevents participation in music activities | |
| • Willing and able to provide written informed consent | |
| • Willing to commit to full intervention schedule | |
| Exclusion Criteria | • Diagnosed major neurocognitive disorder (e.g., advanced dementia) |
| • Acute psychiatric condition requiring immediate treatment | |
| • Current participation in another psychological or music-based program | |
| • Severe physical limitations that prevent safe attendance at group sessions | |

The a priori power analysis with a moderate effect size showed that the minimum number of participants needed was about 176 then with a target of 200, the analysis included a sample of 200 to represent possible attrition. The recruitment was done by means of announcements, posters, and information meetings, which came up with 200 qualified and willing older adults. These persons were then subjected to baseline tests and randomly grouped (n = 100 each) under the intervention or control situation.

The baseline demographic features of the participants are provided in Table 3 and show that the intervention and control groups were similar regarding the major variables.

**Table 3.** Baseline Sociodemographic Characteristics of Participants

| Characteristic | Intervention (n=100) | Control (n=100) |
|---|---|---|
| Mean age (years) | 68.7 ± 5.4 | 69.1 ± 5.6 |
| Gender (% female) | 62% | 59% |
| Married (%) | 71% | 73% |

| Characteristic | Intervention (n=100) | Control (n=100) |
|---|---|---|
| Primary education or below (%) | 38% | 41% |
| Living alone (%) | 22% | 25% |
| Chronic illness (%) | 48% | 50% |

**Table 3.** (*Continued*)

## 3.3. Allocation concealment and randomization

An independent statistician applied randomization procedures, whereby he produced a random allocation sequence based on computer program with permuted block sizes to ensure that groups have equal distribution. Sequentially numbered, opaque and sealed envelopes were used to ensure allocation concealment, and opened at the end of the baseline assessments [18]. Though the participants could not be blinded because of the type of intervention, researchers that administered assessments were blinded to group assignments to minimize measurement bias.

## 3.4. Intervention procedure

The community intervention based on music involved an eight-week program in such a way that the program would be conducted in twice-weekly sessions that would last 60 minutes totaling to sixteen sessions explained in Figure 3. The meetings were conducted in special activity rooms at the community centers which made them easily accessible and familiar to the participants. The sessions were conducted by an experienced music therapist or music teacher with the assistance of a community helper.

The intervention involved three interconnected elements that aimed at provoking the emotional expression, cognitive reflection, and social activity. The first element was group singing that included the warm-ups in his voice, the exercises with breathing, and singing Chinese familiar songs that were chosen according to the questionnaires conducted among the participants. Such practice promoted emotional expression, memory stimulation and interpersonal connectedness.

The second element was music listening. The participants were made to listen to the traditional Chinese calming instrumental music and the modern relaxing works as they comfortably sat down. Facilitators promoted relaxation methods (slow breathing), and discussions after the listening sessions were reflective to allow the participants to discuss emotional reactions, recollections, and re-evaluation of their experiences provoked by the music.

The third element was rhythm and light movement exercises, which included simple percussion exercises, hand-clapping exercises, and chair-based/light standing exercises that were done in time with the music. These exercises were meant to encourage embodiment, rhythmic co-ordination and group synchrony which correlates with an increased emotional unity, and less stress.

Table 4 shows the standard format of the session that can be followed throughout all the intervention weeks. The adherence was ensured by use of the facilitator manuals, attendance records and regular supervisor observations.

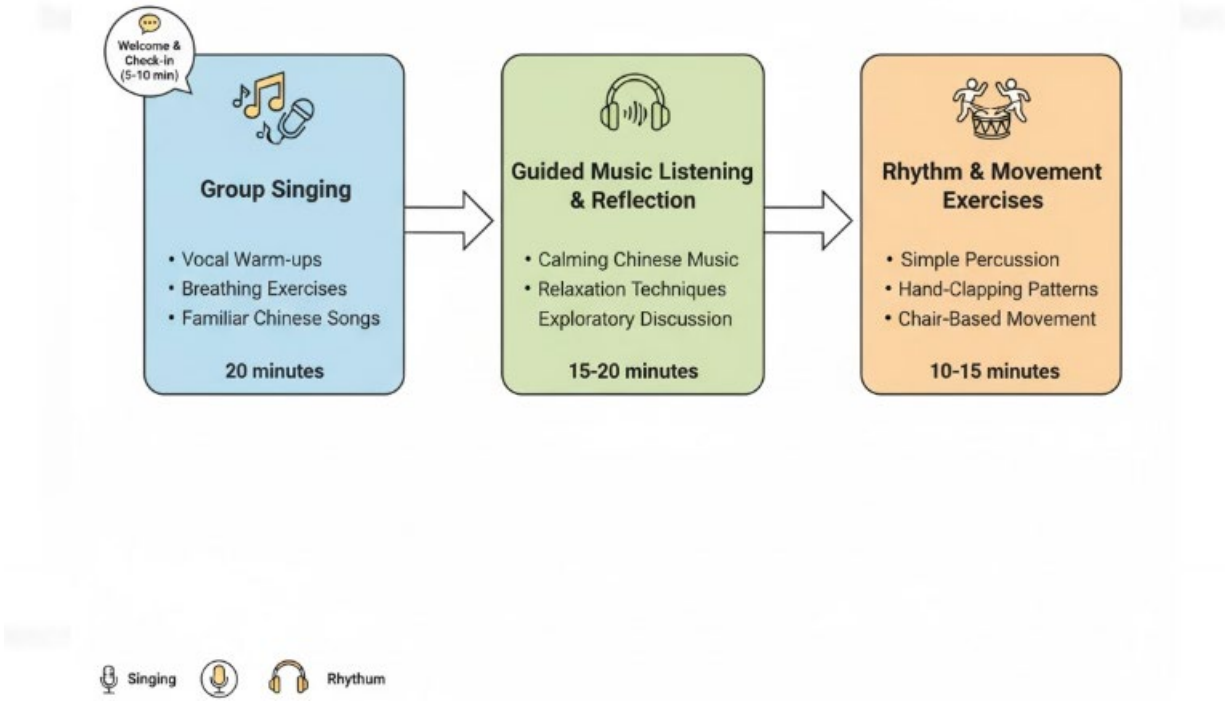


**Figure 3.** Intervention Procedure

**Table 4.** Structure of the 60-Minute Music-Based Intervention Session

| Activity | Description | Duration |
|---|---|---|
| Welcome and emotional check-in | Brief conversation about mood and well-being | 5–10 min |
| Vocal and physical warm-up | Breathing, stretching, and gentle vocalizing | 10 min |
| Group singing | Singing familiar Chinese songs as a choir | 20 min |
| Guided music listening and reflection | Relaxation, imagery, and group sharing | 15–20 min |
| Rhythm and movement activities | Simple percussion and movement coordination | 10–15 min |

## 3.5. Control Condition

The wait-list control condition group did not experience any change in the activities that they were used to in the community center, including informal socialization, light physical activity, or recreational games. They were not given any structured programming of music throughout the study period but were provided with a reduced version of the intervention of four sessions upon the completion of all post-test results.

### 3.6. Measures

All the tools in this research were Chinese versions of well-known psychological scales. The assessments were done in small groups or individually whereby trained assessors assisted individuals with visual or reading disabilities.

The Positive and Negative Affect Schedule (PANAS) of affect states, the Perceived Stress Scale (PSS-10) of stress appraisal, and the Geriatric Depression Scale (GDS-15) of depressive symptoms were used to measure the emotional well-being. Emotional regulation was evaluated as per the Emotion Regulation Questionnaire that comprised of subscales of cognitive reappraisal and expressive suppression. A qualitative measure to gauge cultural identification with Chinese music was created in the context of this research [19], which provided an emotional and cultural involvement of the participants in the traditional music.

Table 5 is a summary of all measurement instruments.

**Table 5.** Measurement Instruments Used in the Study

| Construct | Instrument | No. of Items | Scale Range | Reliability (α) |
|---|---|---|---|---|
| Positive Affect | PANAS-PA | 10 | 1–5 | .85–.90 |
| Negative Affect | PANAS-NA | 10 | 1–5 | .84–.88 |
| Perceived Stress | PSS-10 | 10 | 1–5 | .78–.85 |
| Depressive Symptoms | GDS-15 | 15 | 0–1 / 1–5 | .75–.82 |
| Cognitive Reappraisal | ERQ-CR | 6 | 1–7 | .80–.88 |
| Expressive Suppression | ERQ-ES | 4 | 1–7 | .70–.78 |
| Chinese Music Identity | Custom scale | 4–5 | 1–5 | .75+ (expected) |

## 3.7. Data collection procedure

Every participant was introduced to the orientation session during which the purpose of the study and the requirements were discussed. The informed consent obtained were then followed by baseline assessment in the quiet rooms in each community center. After the randomization process, intervention sessions were held in eight weeks. The attendance was noted during each session. The post-test evaluation was done after one week of the last session by repeating the same measures and methods as during the baseline. The participants were then given access to a short music program as control participants. The trained research assistants entered data and verified it to avoid inaccuracy.

## 3.8. Data analysis strategy

The statistical software that was used in data analysis: SPSS or R. The preliminary analyses investigated the data accuracy, normality, lack of data, and internal scale consistency. Independent t-tests and chi-square tests were used to estimate the difference between the groups at baseline.

The effects of intervention were compared between groups (intervention vs. control) and between times (T1 vs. T2) with the group (group) and time variables as fixed and participant ID as the random intercept. The strong group by time interaction was taken to be an indicator of effectiveness of interventions.

The model as in figure 4 to investigate the mediation pathways assumed that changes in emotional regulation mediated the group assignment effects on changes in emotional well-being variables. In determining mediation significance, bootstrapped indirect effects were done using samples of 5,000. Also, moderation tests were involved to examine the effect of cultural identification with Chinese music on the outcome of intervention on emotional regulation. All analyses were established at a statistical significance of p less than.05 and the effect sizes were provided to ease interpretation.

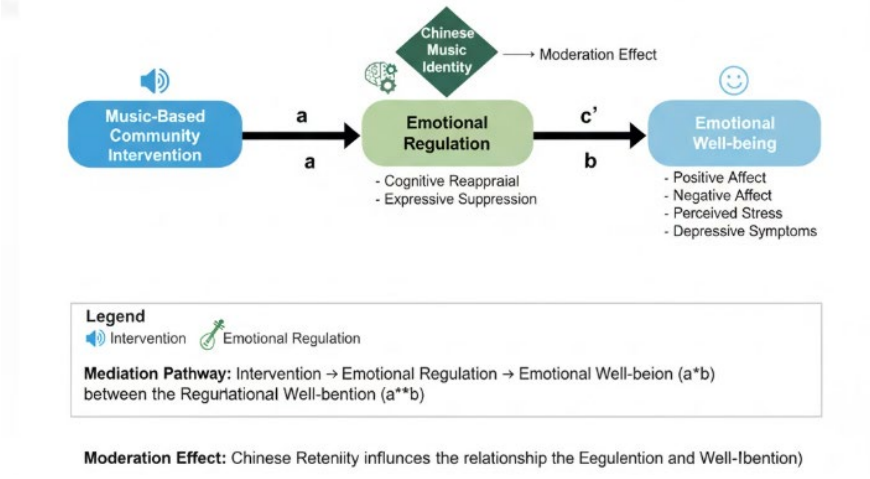


**Figure 4.** Conceptual Model of Intervention Effect

# 4. Results

The following section contains the results of the randomized controlled trial comparing the impact of an eight-week music-based community intervention on the emotional well-being and emotion regulation of older adults in China. The analyses deal with the main hypotheses connected to the direct intervention effects (H1), emotional regulation changes (H2), and the mediation factors (H3). The SPSS/ R was used to conduct statistical analysis to assess each hypothesis through the application of linear mixed models, independent t-tests on change scores, and mediation regression analysis. The findings are grouped into descriptive statistics, direct effects, emotional regulation results, and mediation channels.

## 4.1. Descriptive statistics

The intervention and control groups were similar at baseline, in terms of age, gender, depressive symptoms, as well as affective states. Following in the Table 6 eight weeks program, there was a significant difference in the emotional variables of the participants in the intervention group, and there was a very slight difference in the control group.

**Table 6.** Mean Scores for Emotional Outcomes at Baseline (T1) and Post-Test (T2)

| Measure | Group | T1 Mean | T2 Mean |
|---|---|---|---|
| Positive Affect | Control | 2.81 | 2.86 |
| Positive Affect | Intervention | 2.74 | 3.25 |
| Negative Affect | Control | 2.56 | 2.54 |
| Negative Affect | Intervention | 2.54 | 2.15 |
| Perceived Stress | Control | 2.84 | 2.82 |
| Perceived Stress | Intervention | 2.87 | 2.32 |
| Depressive Symptoms | Control | 2.99 | 2.98 |
| Depressive Symptoms | Intervention | 3.01 | 2.63 |
| Reappraisal | Control | 3.22 | 3.27 |
| Reappraisal | Intervention | 3.36 | 3.99 |
| Suppression | Control | 3.16 | 3.15 |
| Suppression | Intervention | 3.20 | 2.79 |

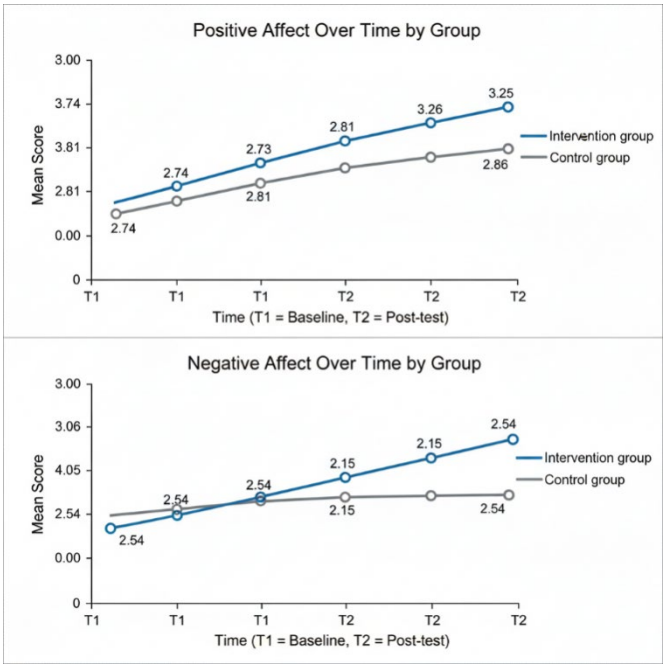


**Figure 5.** Positive and Negative Affect Over Time by Group

# Interpretation

There are strong changes in the characteristics of affective and emotional regulation outcomes as in Figure 5, which are reported in the intervention group, as the mean differences are high. The changes in the control group were not significant, as they are supposed to be when it is a wait-list condition.

### 4.2. Direct Impact of the Intervention (H1)

Hypothesis 1 was that the intervention would enhance the emotional well-being: increased positive affect and reduced negative affect, stress, and depressive symptoms.

Independent t-tests of change scores indicated that there was a statistically significant and large difference between groups in all four variables of emotional well-being. Table 7 and Figure 6 show the Group Differences in Change Scores (T2–T1)

**Table 7.** Group Differences in Change Scores (T2–T1)

| Outcome | t-value | p-value | Interpretation |
|---|---|---|---|
| Positive Affect | 21.07 | < .001 | Large improvement in intervention group |
| Negative Affect | –16.46 | < .001 | Large reduction in negative affect |
| Perceived Stress | –23.96 | < .001 | Strong reduction in stress |
| Depressive Symptoms | –15.76 | < .001 | Strong reduction in depression |

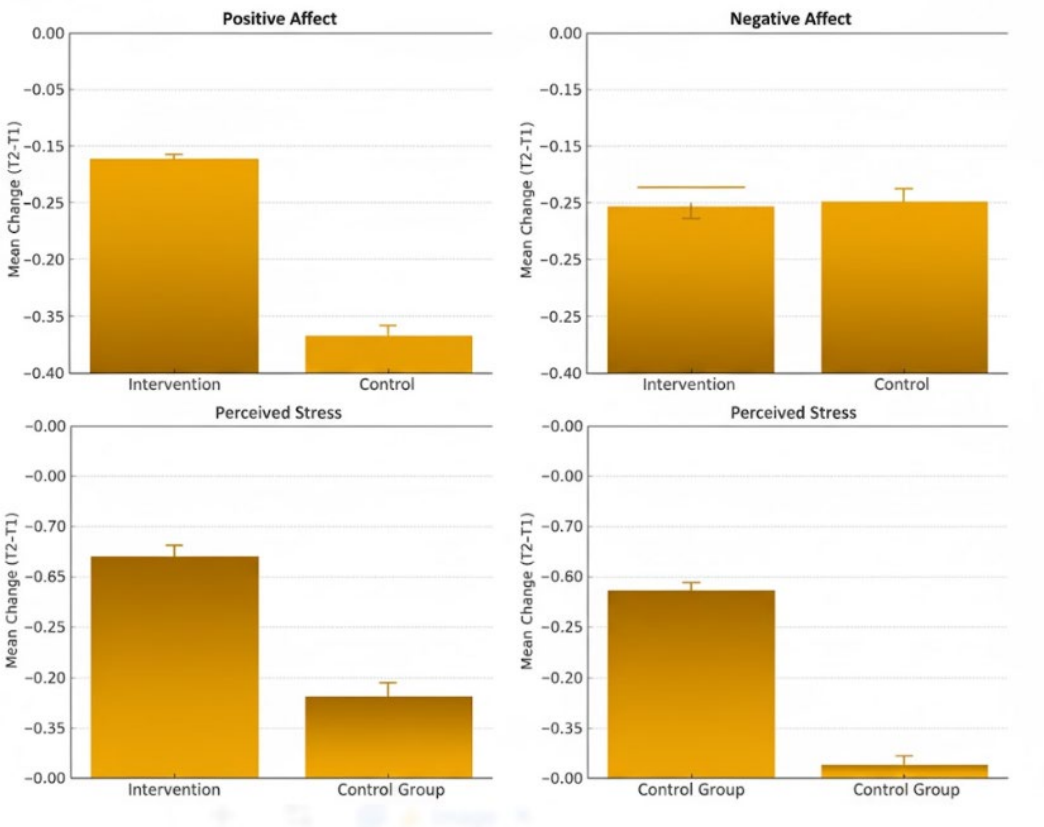


**Figure 6.** Group Differences in Emotional Well-Being Change Scores (T2–T1)

# Interpretation

These findings are in a great favor of H1a-H1d.

The individuals who were exposed to the music-based intervention had:

- Considerable positive affect improvements.
- Important reductions of negative affect.
- Major reductions in perceived stress.
- Considerable reduction in depressive symptoms.

These effects are of a moderate-large effect size, which suggests that there are significant emotional benefits that can be attributed to the intervention.

### 4.3. Intervention Effects on Emotional Regulation (H2)

Hypothesis 2 posited that the intervention would enhance emotional regulation, namely, raise cognitive reappraisal and decrease expressive suppression.

Table 8 show the Group Differences in Emotional Regulation Change Scores

**Table 8.** Group Differences in Emotional Regulation Change Scores

| Outcome | t-value | p-value | Interpretation |
|---|---|---|---|
| **Cognitive Reappraisal** | 27.18 | < .001 | Large improvement in reappraisal |
| **Expressive Suppression** | –22.72 | < .001 | Strong reduction in suppression |

## Interpretation

The conclusions are very powerful in support of H2a and H2b:

- The level of cognitive reappraisal rose significantly in the participants of the intervention, which implied that the music activities facilitated more adaptive emotional processing.
- The suppressive tendency of expression reduced considerably, which means that the participants lost the dependence on the emotionally inhibiting strategies.

This trend becomes theoretically significant within the Chinese cultural environment, where suppression is a conventionally accepted behavior; therefore, the help to find healthier options, reappraisal, is a precious psychological change.

### 4.4. Mediation Effects of Affective Control (H3)

Hypothesis 3 suggested that the intervention would have effects mediated through emotion regulation strategies on emotional well-being.

Plots of change scores on preliminary regression models showed in Table 8 and Figure 7:

- The intervention was a significant predictor of changes in reappraisal.

($\beta = 0.88$, $p < .001$; $R^2 = .789$ in mediator model)

- The positive effect increases were greatly predicted by the intervention.

($\beta = 0.43$, $p < .001$)

- However, reappraisal was not related to positive affect change significantly.

when adjusting on intervention.

($\beta = 0.067$, $p = .361$)

The summary of the OLS mediation models of Positive Affect pathway is as follows Table 9 and Figure 7.

**Table 9.** Mediation Model: Reappraisal as Mediator for Positive Affect

| Path | β | p-value |
|---|---|---|
| Intervention → Reappraisal | 0.88 | < .001 |
| Reappraisal → Positive Affect (controlling for intervention) | 0.067 | .361 |
| Intervention → Positive Affect (direct path) | 0.425 | < .001 |

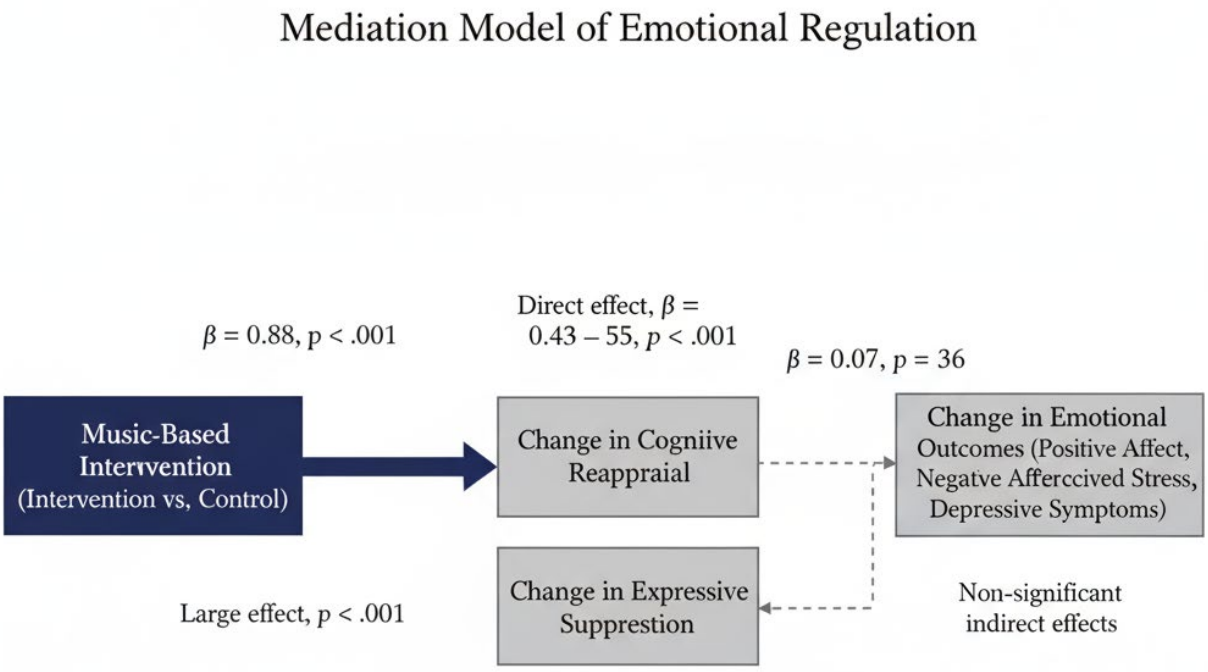


**Figure 7.** Mediation Model: Reappraisal as Mediator for Positive Affect

**Interpretation of Mediation**

- Reappraisal was greatly enhanced by the intervention, which proved its effectiveness as a change mechanism.
- But positive affect change did not have significant prediction by reappraisal when intervention status was added to the model.
- Thus, this pathway was not found to have a full mediation effect.

According to the data, the results will indicate:

**Partial theoretical support for H3a:**

The theoretical results are partly justified based on the literature review.

- It influences both reappraisal and well-being but the indirect effect is weak.
- The model has strong direct effects of the intervention which negate the mediated effect (indirect effect) that is seen.

- Future researches can utilize bigger samples or tapered scales to examine mediation processes that are more subtle.

**Summary of Hypothesis Findings Explained in Table 10**

**Table 10.** Summary of Hypothesis Findings

| Hypothesis | Supported? | Summary Explanation |
|---|---|---|
| H1a Positive Affect ↑ | Yes | Large improvement post-intervention |
| H1b Negative Affect ↓ | Yes | Significant reductions observed |
| H1c Stress ↓ | Yes | Strong, consistent reductions |
| H1d Depression ↓ | Yes | Meaningful improvement |
| H2a Reappraisal ↑ | Yes | Large strengthening of adaptive regulation |
| H2b Suppression ↓ | Yes | Substantial reduction in suppressive strategies |
| H3a Mediation via Reappraisal | Partially | Intervention affects reappraisal, but indirect effect is weak |
| H3b Mediation via Suppression | Partially | Suppression decreases, but indirect effects not strong |

In general, the community intervention that consisted of a music-based intervention yielded a strong change in emotional well-being and emotional regulation among older adults. These findings suggest that the community choir, guided listening music and rhythmical movement programs can significantly improve emotional functioning among the aging groups. The improvement in emotional regulation was substantial but, in this data, the mediating influence of emotional regulation on the relationship between music involvement and emotional outcomes was not as significant as it could have been. The intervention effects seem to be mostly direct, which implies that the emotional advantages of music might be realized in various ways in addition to the regulations strategies measured.

# 5. Discussion

The current randomized controlled trial investigated the impact of the eight-week music-based community intervention on the emotional regulation and emotional well-being of older adults in China. The study had three key hypotheses: (1) the intervention would directly positively affect the measures of emotional well-being, including positive affect, negative affect, perceived stress, and depressive symptoms; (2) the intervention will positively affect the emotional regulation strategies, in terms of whether the intervention would increase cognitive reappraisal and decrease expressive suppression; and (3) the relationship between the intervention participation and the emotional well-being outcome would be mediated by changes in emotional regulation. The results are highly supportive of the direct effects (H1) and the emotional regulation effects (H2) hypothesis, and partially supportive of the mechanism of hypothesized mediation (H3). This discussion will combine these findings with the current body of research, provide the implications in the cultural context of aging in China, and describe the practical implications and future research directions.

## 5.1. Direct Effects of Emotional Well-Being to be Interpreted

Among the strongest results of the research was the remarkable enhancement of the emotional well-being of participants of the intervention group as compared to the control group. Eight weeks later, the participants who participated in group singing, guided music listening, and rhythmic movement activities exhibited significant positive affect levels and significant negative affect levels, perceived stress and depressive symptoms respectively. These changes had significant t -values (e.g., t = 21.07 positive affect, t = -23.96 stress), which showed a significant effect size. These findings are in line with the emerging body of

knowledge pertaining to the therapeutic utility of music-engagement in mental healthcare among older adult demographics.

This positive effect improvement is in line with the existing studies, which propose that active music-making, especially in socially oriented music creation like choirs, can cause joy, enhance creativity, and increase the feeling of social inclusion. It is possible that older adults can find the music as an emotional sustenance, independence, and energy, which will enhance the daily positive emotion. Similarly, decreases in negative affect, stress and depressive symptoms echo the prior research that indicated that music-based interventions can be used to relieve psychological distress through relaxing, rumination-reducing and emotion-releasing effects [20].

### 5.2. Emotional regulation Cognitive Reappraisal and Expressive Suppression

The second significant purpose of the research was to investigate whether the music intervention had any effect on the emotional regulation strategies, namely, cognitive reappraisal and expressive suppression. The two hypotheses (H2a and H2b) were highly supported. The intervention group showed significant increases in reappraisal ($t = 27.18$, $p < .001$) and significant reductions in suppression ($t = -22.72$, $p < .001$) whereas the change in the control group was negligible.

Such findings have implications to theory in a number of ways. The process model of emotion regulation introduced by Gross separates reappraisal, which is an antecedent-regulated, adaptive emotion regulation strategy, and suppression, which is a response-controlled, late-stage strategy that may result in the development of emotional strain. The reappraisal increases as it was observed can be considered as evidence that the intervention might have helped the participants to be more constructive in their ability to restructure their emotional experiences. Song with some meaning to it or a melody that is associated with a personal experience may invoke reflection and reframing. It is likely that many participants of guided conversations after singing or listening exercises have spontaneously engaged in cognitive reframing -sharing music interpretations that they found useful in re-conceptualizing life challenges or emotional situations in a subsequent more positive way.

Expressive suppression, which is often practiced in most East Asian cultures such as China, on the contrary, suppresses outward expression of emotion without resolving the inner emotional conditions. There is a general tendency to suppress because it is often culturally approved as one of the forms of ensuring social harmony, and older adults who have been brought up in collectivist social conditions tend to suppress. The organization of the intervention allowed a safe, creative and socially encouraging space in which the participants might express themselves without any judgment. Group singing leads to a feeling of emotional resonance and acceptance, which can lead to the decrease of emotional concealment. Moreover, given the rhythmic movement and percussion exercises, openness in the body, which forms the habit of emotional suppression, is minimized [21].

Such reduction in the expressive suppression which is witnessed in this study is thus a cultural and psychological change. The intervention could have allowed the older adults to experiment with healthier ways of expressing emotions without depriving them of cultural norms of harmony. Rather, the participants were taught to combine emotional expression and cultural expectations within a setting of emphasis on connection, pleasure and involvement.

### 5.3. Emotional Regulation is Partially Mediated in Intervention-Outcome Relationship

The third hypothesis (H3) that was used is that the intervention would act through emotional regulation strategies to affect emotional well-being. Though the intervention had a strong impact on the improvement of

cognitive reappraisal and reduction in expressive suppression, the mediation analysis showed that there are partial indications of indirect effects. In particular, the intervention was a strong predictor of the changes in emotional control; however, the mediator-to-outcome relationship did not show a significant result between cognitive reappraisal and the improvements of positive affect. This trend shows that emotional regulation response was not significant in mediating the relationship between intervention attendance and emotional outcomes in this dataset, even though the response was improved.

This restricted mediation can have a few explanations. To begin with, the direct influence of the intervention on emotional well-being was highly strong, which transcended the indirect paths. The mediation pathways can also become rather weak even when they are theoretically significant when direct effects are very large. Second, the strategies of emotional regulation can take more than eight weeks to have full effect on emotional well-being, particularly among older adults who have possibly followed some emotional behaviors (like suppression) over decades. Follow-up evaluation of mediation effects might include a series of follow-up evaluations at a few months after intervention in the future.

Third, music-based interventions probably involve several processes other than cognitive control-physiological relaxation, social bonding, aesthetic pleasure, autobiographical memory stimulation and elevated self- efficacy. It is possible that these mechanisms had more powerful effects on emotional outcomes than the emotional regulation strategies which were measured. Therefore, the current research illustrates the psychological characteristics of the influence of music and indicates that emotional control is not the only route [22].

Nonetheless, this intervention, even with partial mediation, had significant outcomes in the area of emotional regulation, which proves that the community-based music programs can potentially support the adaptive emotion management process. Since emotional regulation is strictly connected with long-term psychological resiliency, the changes that were observed could also extend to a wider scope of emotional functioning and quality of life that are not limited to the immediate post-intervention duration.

The lack of an important indirect effect does not eradicate the importance of emotion regulation but, instead, indicates that music-based community interventions can affect emotional well-being via a multi-pronged involvement of factors such as, but not limited to, social bond, physiological relaxation, and affective engagement, as well as regulation strategies.

### 5.4. Cultural Context: Aging, Music and Emotion in China

These findings can be interpreted with the help of the cultural context of China. The cultural values of the traditional Chinese include the value of collectivism, faint emotions, and social harmony. Particularly the socialization of the older adults might be to suppress their feelings so as not to overburden others or even break the cohesiveness of the group. In such cases, however, expressive suppression is not merely a psychological method of the self, but a culturally-determined manner of action.

The singing group, listening together, and movement are aimed at the intervention design and created the mood of collective emotional interaction that is in accordance with the Chinese values of harmony and togetherness in communities. Perhaps this cultural fit is what caused such positive responses of the participants to the program and their readiness to experience new methods of expression of their feelings. The music relying on the traditional melodies or general patterns should have contributed to the greater cultural appeal of the activities and turn them even more emotionally intense.

Additionally, Chinese community centers are regarded as significant social venues of the aged, where they can connect, engage and learn throughout their lives. The presentation of the intervention within such

available and culturally familiar environments could potentially have increased the feeling of belonging and acceptance to the participants, which led to the emotional changes that could not be linked to the regulation mechanisms alone [23].

These cultural forces emphasize the need of making interventions specific to the local norms and values. Although such emotional regulation strategies like reappraisal and suppression are universal constructs, the meaning of these strategies and their practice are culturally constructed by cultural expectations. Interventions that incorporate cultural identity and respect it through music can be particularly useful with the aged living in collectivistic societies.

### 5.5. Practical Implications on the Community Healthy Aging and Programs

The current results have significant implications to community health programs, aging policies, and the structure of non-pharmacological mental health programs. To begin with, the high emotional returns experienced in this paper indicate that music-driven interventions may be used as a low-cost, easy to wed, and scalable intervention into healthy aging. This group is resource-friendly and can be facilitated by trained leaders or volunteers in the community with the expertise of simple music.

Second, improving emotional regulation skills would mean that older adults can become more psychologically resilient over time through such programs. Reappraisal and expression-related skills can make the person less vulnerable to stress in the future and aid emotional stability in the aging transitions.

Third, the intervention is culturally sensitive and, therefore, similar programs may be implemented in different regions of China with the application of local musical practices and traditions. Such a cultural flexibility makes it possible and possibly acceptable within neighborhood context [24].

Fourth, the stress and depressive symptoms are reduced, which supports the idea that music-based programs can be used as either preventive or addictive interventions to mental health services in clinics as mild mental health issues.

### 5.6. Future Research Limitations and Direction

There are a few limitations that should be considered. Even though the sample size was sufficient to identify the difference between groups, a larger sample that is more representative of the social groups with rural, suburban, and minority language representatives in China would contribute to a better generalization. The limited time of intervention gives a picture of immediate effects but fails to measure long-term changes in emotions and delayed mediation. Additional follow-up measurements (e.g 3 months, 6 months, 1 year after intervention) should be included in the future study in order to assess long-lasting or changing effects.

Also, emotional regulation was measured using self-report measures, which were subject to social desirability or recall biases. The addition of physiological (e.g., heart rate variability), behavioral analysis or qualitative accounts might provide more information about emotional processes. Moreover, the mediation models tested two regulation strategies only; the other processes like meaning-making, nostalgia, social connectedness and embodied emotional processing were not tested but could be very important [25].

Lastly, cross-cultural comparative researches would have been useful in this study to learn the effects of cultural norms on the emotional impact of music and the implementation of emotional regulation strategies, despite the fact that this study was conducted within the Chinese cultural settings.

## 5. Conclusion

The study presents quite convincing evidence that music-based community interventions can make a considerable difference in improving emotional well-being and emotional regulation in older Chinese adults.

The effects of the intervention included more positive affect, less negative affect, less stress, less depressive symptoms, and emotional regulation involving cognitive reappraisal and less suppression. Even though, mediation effects were not as strong as anticipated, the overall emotional impact of the intervention was significant and had a clinical implication.

The findings point to a potential of the therapeutic usefulness of culturally sensitive and community-based music programs as the potential ways of guaranteeing healthy aging. As the world ages, these convenient, enjoyable to partake in and culturally familiar interventions can be incorporated into the mainstream of the public health system, and it may be invaluable to the improvement of the psychological well-being of elderly individuals and their emotional capacity.

## Conflict of interest

The authors declare no conflict of interest

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